WE CLAIM:

1. An encapsulated electronic device, comprising;
a first laminar electrode,
a second laminar electrode,
an element of electronically active material sandwiched between said first laminar electrode and said second laminar electrode,
a region of insulating material enclosing said first laminar electrode said second laminar electrode and said element of active material,
a first terminal for facilitating an external electrical connection to the first laminar electrode,
a second terminal for facilitating an external electrical connection to the second laminar electrode,
a first conductive interconnection that passes through the region of insulating material to electrically connect the first terminal and the first laminar electrode,
a second conductive interconnection that passes through the region of insulating material to electrically connect the second terminal and the second laminar electrode, and
wherein at least one of said first conductive interconnections and second conductive interconnections comprises a metal plating.

2. An encapsulated electronic device according to claim 1, wherein said first conductive interconnections and second conductive interconnections both comprise metal plating.

3. An encapsulated electronic device according to claim 1, wherein said electronic device is a leaded device having a first lead affixed to said first terminal and a second lead is affixed to said second terminal.

4. An encapsulated electronic device according to claim 1, further comprising a third terminal located on the same side of the device as the first terminal and electrically connected to the second terminal by a first electrical connection formed between

opposing sides of the device through said region of insulating material.

5. An encapsulated electronic device according to claim 4, wherein said first electrical connection comprises a plated through hole via.

6. An encapsulated electronic device according to claim 4, wherein said device is a leaded device having a first lead affixed to said first terminal and a second lead affixed to said third terminal.

7. An encapsulated electronic device according to claim 4, wherein said device is a surface mountable device and said first and third terminals provide SMT connections.

8. An encapsulated electronic device according to claim 4, wherein said device comprises a fourth terminal located on the same side of the device as the second terminal and electrically connected to the first terminal by a second electrical connection formed between opposing sides of the device through said region of insulating material.

9. An encapsulated electronic device according to claim 8, wherein said second electrical connection comprises a plated through hole via.

10. An encapsulated electronic device according to claim 1, wherein said region of insulating material comprises a first layer of insulating material separating said first laminar electrode and said first terminal.

11. An encapsulated electronic device according to claim 10, wherein said region of insulating material comprises a second layer of insulating material separating said second laminar electrode from said second terminal.

12. An encapsulated electronic device according to claim 11, wherein said region of insulating material comprises a printed circuit board material having an aperture

defined therein in which said element of active material is received.

13. An encapsulated electronic device according to claim 1, wherein said active material is a positive temperature coefficient material.

14. An encapsulated electronic device according to claim 13, wherein said positive temperature coefficient material is a polymeric material.

15. An encapsulated PTC device comprising a segment of insulating material having an aperture defined therein;
an element of PTC material received within said aperture,
a first metal layer forming a first laminar electrode substantially covering a first side of the PTC element,
a second metal layer forming a second laminar electrode substantially covering a second side of the PTC element,
a first layer of insulating material substantially covering the first electrode,
a second layer of insulating material substantially covering the second electrode
a first terminal for providing an external electrical connection to the first electrode,
a second terminal for providing an external electrical connection to the second electrode,
wherein the first terminal is connected to the first electrode by a first conductive interconnection that passes through the first insulating layer and where the second terminal is connected to the second electrode by a second conductive interconnection that passes through the second insulating layer.

16. An encapsulated PTC device according to claim 15, wherein the segment of insulating material comprises circuit board material.

17. An encapsulated PTC device according to claim 16, wherein the circuit board material is a laminate structure of glass or aramid fibers bonded with a resin

material.

18. An encapsulated PTC device according to claim 15, wherein the first and second layers of insulating material are provided as layers of resin.

19. An encapsulated PTC device according to claim 15, wherein said segment of insulating material is provided by the first and second insulating layers.

20. An encapsulated PTC device according to claim 15, wherein said PTC device is a leaded device and wherein leads are fixed to first and second terminals.

21. A battery strap comprising at least one encapsulated PTC device according to claim 20.

22. An encapsulated PTC device according to claim 15, further comprising a third terminal which is electrically connected to the second terminal by a first conductive interconnection that passes through the insulating segment.

23. An encapsulated PTC device according to claim 15, wherein said PTC device is a leaded device and wherein leads are fixed to the first and third terminals.

24. A battery strap comprising at least one encapsulated PTC device according to claim 23.

25. An encapsulated PTC device according to claim 22, wherein the first conductive interconnection that passes through the insulating segment comprises a plated through hole via.

26. An encapsulated PTC device according to claim 22, further comprising a fourth terminal which is electrically connected to the first terminal by a second conductive interconnection that passes through the insulating segment.

27. An encapsulated PTC device according to claim 26, wherein the second conductive interconnection that passes through the insulating segment comprises a plated through hole via.

28. An encapsulated PTC device according to claim 26, wherein the first, second, third and fourth terminals are suitably disposed to provide a symmetrical device.

29. An encapsulated PTC device according to claim 15 wherein the terminals are metal plated.

30. An encapsulated PTC device according to claim 29 wherein the metal plating is a combination of copper, nickel and/or gold.

31. An encapsulated PTC device according to claim 30 wherein the plating comprises three separate metal plates of copper, nickel and gold.

32. A method of manufacturing an electronic device, comprising the steps of:
providing an element of electronically active material having a first metal layer as a first laminar electrode and a second metal layer as a second laminar,
surrounding the first laminar electrode, the second laminar electrode and the segment of electronically active material with a region of insulating material,
providing a first terminal for facilitating an external electrical connection to the first laminar electrode,
providing a second terminal for facilitating an external electrical connection to the second laminar electrode,
creating a first opening through the region of insulating material,
providing a conductive path in said first opening to electrically connect the first terminal and the first laminar electrode, and
creating a second opening through the region of insulating material,
providing a conductive path in said second opening to electrically connect the second terminal and the second laminar electrode.

33. A method of manufacturing an electronic device according to claim 32, wherein said step of surrounding the first laminar electrode, the second laminar electrode

and the segment of electronically active material with a region of insulating material comprises the steps of placing the element of active material into an aperture defined in a printed circuit board material.

34. A method of manufacturing an electronic device according to claim 32, comprising the additional steps of fixing a first lead affixed to said first terminal and a second lead to the second terminal.

35. A method of manufacturing an electronic device according to claim 32, comprising the additional steps of:
providing a third terminal on the same side of the device as the first terminal, and electrically connecting the third terminal to the second terminal using a first electrical connection formed between opposing sides of the device through said region of insulating material.

36. A method of manufacturing an electronic device according to claim 35, wherein said step of electrically connecting the third terminal to the second terminal is implemented by metal plating.

37. A method of manufacturing an electronic device according to claim 35, comprising the additional steps of fixing a first lead affixed to said first terminal and a second lead to the third terminal.

38. A method of manufacturing an electronic device according to claim 35, comprising the additional steps of:
providing a fourth terminal located on the same side of the device to the second terminal,
and electrically connecting the fourth terminal to the first terminal using a second electrical connection formed between opposing sides of the device through said region of insulating material.

39. A method of manufacturing an electronic device according to claim 38, wherein said step of electrically connecting the fourth terminal to the first terminal using is implemented by metal plating.

40. A method of manufacturing an electronic device according to claim 32, wherein said step of surrounding the first laminar electrode, the second laminar electrode and the segment of electronically active material with a region of insulating material,
comprises the step of covering said first laminar electrode with a first layer of insulating material.

41. A method of manufacturing an electronic device according to claim 32, wherein said step of surrounding the first laminar electrode, the second laminar electrode and the segment of electronically active material with a region of insulating material,
comprises the step of covering said second laminar electrode with a second layer of insulating material.

42. A method of manufacturing an electronic device according to claim 32, wherein said active material is a positive temperature coefficient material.

43. A method of manufacturing an electronic device according to claim 42, wherein said positive temperature coefficient material is a polymeric material.

44. A method of manufacturing an encapsulated PTC device comprising the steps of;
surrounding the circumference of an element of PTC material with a segment of insulating material,
providing said element of PTC material with a first laminar electrode substantially covering a first side of the PTC element,
providing said element of PTC material with a second laminar electrode substantially covering a second side of the PTC element,
forming a first layer of insulating material substantially covering the first

electrode,

forming a second layer of insulating material substantially covering the second electrode,

providing a first terminal for facilitating a external electrical connection to the first laminar electrode,

providing a second terminal for facilitating an external electrical connection to the second electrode,

forming an electrical connection between the first terminal and the first electrode through said first insulating layer, and

forming an electrical connection between the second terminal and the second electrode through said second insulating layer.

45. A method of manufacturing an encapsulated PTC device according to claim 44, wherein the segment of insulating material comprises circuit board material.

46. A method of manufacturing an encapsulated PTC device according to claim 44, wherein the circuit board material is a laminate structure of glass or aramid fibers bonded with a resin material.

47. A method of manufacturing an encapsulated PTC device according to claim 44, wherein the first and second layers of insulating material are provided as layers of resin.

48. A method of manufacturing an encapsulated PTC device according to claim 44, wherein the step of surrounding the circumference of an element of PTC material with a segment of insulating material is performed using said first and second insulating layers.

49. A method of manufacturing an encapsulated PTC device according to claim 44, comprising the additional step of fixing leads to the first and second terminals.

50. A method of manufacturing an encapsulated PTC device according to claim 44, further comprising the steps of providing a third terminal and electrically connecting it to the second terminal by forming a first conductive interconnection that passes through the insulating segment.

51. A method of manufacturing an encapsulated PTC device according to claim 50, comprising the additional step of fixing leads to the first and third terminals.

52. A method of manufacturing an encapsulated PTC device according to claim 50, wherein a metal plating process is used form the first conductive interconnection that passes through the insulating segment.

53. A method of manufacturing an encapsulated PTC device according to claim 50, comprising the additional steps of providing a fourth terminal and electrically connecting it to the first terminal by forming a second conductive interconnection that passes through the insulating segment.

54. A method of manufacturing an encapsulated PTC device according to claim 50, wherein a metal plating process is used to provide the first conductive interconnection that passes through the insulating segment.

55. A method of manufacturing an encapsulated PTC device according to claim 53, wherein the first, second, third and fourth terminals are positioned to provide a symmetrical device.

56. An encapsulated PTC device according to claim 53 wherein the terminals are plated using a metal plating process.

57. A method of manufacturing a paralleled device comprising the steps of supplying a first matrix comprising a plurality of devices, each device in the first matrix comprising at least one element of electronically active material sandwiched between two electrodes and wherein terminals are provided for each of the two electrodes on both sides of the first matrix,

depositing a conductive fixing material on the terminals on the top surface of the matrix,

placing a second matrix comprising a plurality of devices, each device in the second matrix comprising at least one element of electronically active material sandwiched between two electrodes and wherein terminals are provided for each of the two electrodes on at least the underside of the matrix, such that the arrangement of terminals on the top surface of the first matrix align with the arrangement of terminals on the bottom surface of the second matrix resulting in a combined matrix of paralleled devices.

58. A method of manufacturing a paralleled device according to claim 57, comprising the further step of singulating paralleled devices from the combined matrix.

59. A method of manufacturing a paralleled device according to claim 58, wherein said electronically active material is a PTC material.

60. A method of manufacturing a paralleled device according to claim 59, wherein said PTC material is a polymeric PTC material.

61. A matrix of devices wherein each device comprises

a first laminar electrode,

a second laminar electrode,

a segment of electronically active material sandwiched between said first laminar electrode and said second laminar electrode,

a first terminal for facilitating a connection to the first laminar electrode,

a second terminal for facilitating a connection the second laminar electrode,

a first layer of insulating material separating the first terminal from the first laminar electrode,

a second layer of insulating material separating the second terminal from the second laminar electrode,

wherein adjacent elements of electronically active material are separated from

each other by a region of insulating material.

62. A matrix of devices according to claim 61, wherein said region of insulating material is a section of PCB material having apertures defined therein for receiving the elements of electronically active material.

63. A matrix of devices according to claim 61, wherein said region of insulating material comprises said first layer of insulating material and said second layer of insulating material.

64. A matrix of devices according to claim 61, wherein electrical interconnections are provided between the first terminal and the first electrode by at least one plated blind via passing through the first layer of insulating material.

65. A matrix of devices according to claim 61, wherein electrical interconnections are provided between the second terminal and the second electrode by at least one plated blind via passing through the second layer of insulating material.

66. A matrix of devices according to claim 61, wherein each device comprises a third terminal located on the same surface of the matrix as the first terminal and electrically connected to the second terminal by a first electrical connection formed between opposing surfaces of the matrix through said region of insulating material by a plated through hole via.

67. A matrix of devices according to claim 66, wherein the individual devices of the matrix are configured as surface mountable device and said first and third terminals provide SMT connections.

68. A matrix of devices according to claim 66, wherein each device comprises a fourth terminal located on the same surface of the matrix as the second terminal and electrically connected to the first terminal by a second electrical connection formed between opposing surfaces of the device through said region of insulating

material by a plated through hole via

69. A matrix of devices according to claim 61, wherein said active material is a positive temperature coefficient material.

70. A matrix of devices according to claim 69, wherein said positive temperature coefficient material is a polymeric material.

71. A matrix of devices according to claim 66, wherein a shared region of metal provides terminals of adjacent devices.

72. A matrix of devices according to claim 61, wherein said active material is a dielectric material.

73. A matrix of devices according to claim 61, wherein said active material is a resistive material.

74. A matrix of devices according to claim 61, wherein said active material is an magnetic material.

75. A matrix of devices according to claim 61, wherein said active material is a semiconductor material.

76. A component singulated from the matrix of claim 61, comprising at least one device.

77. A component according to claim 76, wherein said component is configured as a SIP component.

78. A component according to claim 77, wherein the first and second terminals of each device are aligned along an edge of the device.

79. A component according to claim 78, wherein said first terminal is connected to an underlying third terminal by means of a plated through hole connection through the region of insulating material.

80. A component according to claim 79, wherein said second terminal is connected to an underlying fourth terminal by means of a plated through hole connection passing through the region of insulating material.

81. A component according to claim 76, wherein said component is configured as a DIP component.

82. A component according to claim 76, wherein said device is a leaded device with a suitable lead frame attached to the first and second terminals.

83. A component according to claim 76, wherein said component comprises a multiple of two devices.

84. A component according to claim 76, adapted to have a further component mounted thereon.

85. A component according to claim 84, wherein said at least one device is a PTC device.

86. A component according to claim 85, wherein said at least one device is a polymeric PTC device.

87. A component according to claim 85, further comprising a voltage protection device fixed on the device.

88. A component according to claim 76, wherein said voltage protection device is a thyristor, metal oxide varistor, or gas discharge tube.